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OPERATING EXPERIENCE WEEKLY SUMMARY

Office of Nuclear and Facility Safety

April 17 through April 23, 1998

Summary 98-16

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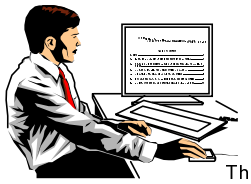

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EVENTS

1. SEVERE WEATHER PLANNING

This week OEAF engineers reviewed several severe weather events and related documents about the potential consequences of tornadoes, hurricanes, and other warm weather phenomena on equipment, systems, and operations. With the onset of the tornado season, personnel at DOE facilities are reminded to review their seasonal facility preservation plans and implement improvements as necessary. Facilities without such plans should begin developing them immediately. In an average year, approximately 800 tornadoes are reported nationwide, and severe damage can result from the thunderstorms and winds normally associated with them. Tornado-related damage, injuries, or deaths usually occur from collapsing buildings or flying objects because of the accompanying winds that can reach speeds over 300 miles per hour. Tornado damage can be costly to clean up or repair and can have severe effects on facility operations, particularly if safety-related systems are damaged or become inoperable.

Thunderstorms can develop into tornadoes. Before a thunderstorm develops, changing wind direction and increasing wind speeds and heights create an invisible, horizontal spinning effect in the lower atmosphere. Rising air then tilts the rotating air to a vertical position, creating an area of rotation within the storm. Tornadoes form inside this area of strong rotation. Sixty-nine percent of all tornadoes are classified as weak, with winds less than 110 miles per hour. Only 2 percent of tornadoes are classified as violent, with winds over 205 miles per hour; however, 70 percent of all tornado deaths are attributed to violent tornadoes. Table 1-1 shows the Fujita tornado scale and describes the types of damages associated with each category.

Tornado Scale	Damage
F-0	40-72 mph, chimney damage, tree branches broken
F-1	73-112 mph, mobile homes pushed off foundation or overturned
F-2	113-157 mph, considerable damage, mobile homes demolished, tree uprooted
F-3	158-205 mph, roofs and walls torn down, trains overturned, cars thrown
F-4	206-260 mph, well-constructed walls leveled
F-5	261-318 mph, homes lifted off foundation and carried considerable distances, autos thrown as far as 100 meters

Table 1-1. Fujita Tornado Scale[1]

[1] This scale can be found at URL http://www.fema.gov/fema/tornadof.html.

OEAF engineers searched the ORPS database for 1998 severe weather events. Following are some examples. NFS has also reported on severe weather events in several Weekly Summaries.

- Oak Ridge facility managers reported that on April 8, 1998, and again on April 16, 1998, shift supervisors directed shutdown of the high flux isotope reactor because of area tornado warnings. (ORPS Reports ORO--ORNL-X10HFIR-1998-0010, and ORO--ORNL-X10HFIR-1998-0011)

- On March 26, 1998, Oak Ridge Environmental Restoration facility managers reported that a wind storm lifted and transported a portable carport approximately 300 yards in the uranium hexafluoride cylinder storage yard, scraping three cylinders. The carport was tied down with concrete saddles. Three of the saddle ropes broke when they were dragged during the wind storm; the fourth saddle remained attached to the carport. The facility manager reported this event as a near-miss because the potential existed for the release of uranium hexafluoride from the cylinders. (ORPS Report ORO--LMES-PGDPENVRES-1998-0003)

- On February 17, 1998, Oak Ridge facility managers reported that power was lost during a severe thunderstorm at the Y-12 Site when a flock of birds flew into a transformer bay, causing it to short circuit. Facility personnel declared the criticality accident alarm system inoperable in accordance with operational safety requirements for a loss of power event. Facility personnel assembled at designated internal assembly points during the storm. The facility manager held a fact-finding meeting after the storm. Attendees learned that operational safety requirements did not address facility personnel taking shelter within an area that contained an inoperable criticality accident alarm. (ORPS Report ORO--LMES-Y12NUCLEAR-1998-0013)

- On February 10, 1998, Strategic Petroleum Reserves Bryan Mound Site facility managers reported that an outdoor motor control center bus bar failed during a wind and rain storm. The strong winds caused the rain to enter the motor control center through ventilation holes. The motor control center enclosure was an approved weather-protective enclosure. The bus bar failed when it became wet and operators energized it during the storm, causing a short circuit and a flash-over. (ORPS Report HQ--SPR-BM-1998-0001)

- On January 17, 1998, Rocky Flats Environmental Technology Site facility managers reported that a main exhaust/supply fan interlock activated because of high winds, causing a minimum ventilation condition. The facility manager terminated operations. Investigators determined that facility personnel had not considered the effects of a northerly wind on atmospheric reference headers. Therefore, they failed to secure plenum doors and inlet dampers to prevent the fan interlock activation. (ORPS Report RFO--KHLL-771OPS-1998-0002)

Collapsing roofs, flooding, equipment and window damage because of flying debris, and electrical malfunctions from water leaking into buildings are frequently reported problems during severe storms. Seasonal facility preservation plans to ensure continued safe facility operations should be established for (1) tornado watches and warnings, (2) hurricane watches and warnings, (3) flash floods, and (4) extreme hot/dry weather. Facility status at the time of a severe weather condition should dictate actions required to place the facility in a state of readiness for bad weather. Facility managers should consider seasonal-related problems a priority and take immediate actions to minimize damage.

Facility managers should determine how long buildings can be without power. They should also develop specific contingency plans for connecting temporary power sources, including (1) what size generator is required; (2) where and how to connect power; (3) where to locate and ground a generator; and (4) how to introduce and route generator power cables into buildings. These contingency plans should be detailed and readily available to the personnel installing temporary power; otherwise, workers could introduce additional hazards into the work environment.

Several steps can be taken to mitigate tornado, hurricane, rain, and wind damage for facility systems and equipment. These steps, together with contingency plans for severe weather, should be incorporated into written procedures and periodically reviewed for adequacy. The following list (from DOE-STD-1064-94, *Guideline to Good Practices for Seasonal Facility Preservation at DOE Nuclear Facilities*) identifies some typical measures that should be included in tornado and hurricane plans.

- Ensure windows are boarded-up or taped.
- Ensure vulnerable equipment is put in a safe shutdown condition.
- Ensure loose materials are firmly secured to prevent potential missiles.
- Ensure stored materials are properly packaged and protected from the weather.
- Ensure emergency evacuation policies and routes are up to date, communicated to facility personnel, and identify safe locations for evacuation.

Tornado and hurricane warnings do not always allow sufficient time to prepare for storm onsets. Therefore, it is important that facilities have plans and procedures in place before severe weather strikes. A task team should be established to provide for the development and implementation of objectives for severe weather protection plans. Plans should ensure that preparatory actions and requirements imposed to provide seasonal weather protection, particularly those taken to restrict safety system functions, are reviewed by facility operations and safety personnel before implementation. Plans should also include walk-downs and surveillances after storms to determine if equipment or materials sustained damaged. The following map identifies months of peak tornado occurrences throughout the United States.

Figure 1-1. Months of Peak Tornado Occurrence[2]

Facility managers should review their severe weather plans to ensure that (1) dikes can handle additional amounts of water, (2) outdoor temporary structures and equipment are properly secured, (3) water leakage into facilities is minimized, and (4) emergency systems are working effectively. Since long-range weather forecasting has improved, OEAF recommends that facilities implement weather and storm warning monitoring systems to ensure sufficient time exists to implement severe weather plans. The National Weather Service issues tornado watches and warnings. A tornado watch is issued when conditions are favorable to the formation of tornadoes, and personnel should be prepared to take shelter if conditions worsen. A tornado warning is issued when a tornado funnel is sighted or identified on radar; personnel should immediately take shelter. The National Weather Service continuously broadcasts these announcements over National Oceanic and Atmospheric Administration (NOAA) weather radio stations.

Additional information on NOAA nationwide weather radio transmission and frequencies can be found at URL http://www.nws.noaa.gov/nwr/. NOAA also maintains an Internet site located at URL http://www.noaa.gov. The National Weather Service Forecast Office maintains an Internet site at URL http://www.nssl.uoknor.edu/nws/index.html. An emergency manager's weather information network can be found at URL http://www.nssl.uoknor.edu/nws.emwin.html. The Federal Emergency Management Agency provides additional information on tornadoes, hurricanes, and other natural disasters at URL http://www.fema.gov.

Facility managers should review their systems and equipment maintenance histories, policies, procedures, and work-planning processes and should walk down systems to identify potential equipment and systems that could be vulnerable to severe weather. Facility managers should also identify corrective actions and implement them before problems occur.

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[2] Months of peak tornado occurrence are for years 1950 through 1991. This graph can be found in the U.S. Department of Commerce National Oceanic and Atmospheric Administration National Weather Service publication, *Tornadoes...Nature's Most Violent Storms, A Preparedness Guide*, revised February 1995. This guide can be found at URL http://www.nws.noaa.gov/om/tornado.pdf.

- DOE O 420.1, *Facility Safety*, discusses a hazard mitigation program for natural phenomena. The Order states that the program shall include plans for evaluations of systems, structures, and components that are affected by earthquakes, winds, floods, and lightning storms. It also states that facilities with hazardous materials shall have procedures for inspection of the damage caused by severe natural phenomena and placing the facility in a safe configuration when damage occurs.

- DOE-STD-1064-94, *Guideline to Good Practices for Seasonal Facility Preservation at DOE Nuclear Facilities*, provides guidance to assist facility maintenance organizations in the review of existing methods (and the development of new methods) for establishing a seasonal maintenance program. Section 3.4 of the guide includes flash flood, hurricane, and tornado information. This standard also contains guidance for cold weather and other natural disasters.

- DOE-STD-1021-93, *Natural Phenomena Hazards Performance Characterization Guidelines for Structures, Systems, and Components,* provides guidance on assessing system operations to identify hazards to personnel and equipment and on developing hazard prevention or mitigation measures.

- DOE-STD-1010-92, *Guide to Good Practices for Incorporating Operating Experiences*, states: "The use of experience gained should provide a positive method that a facility can use to improve their operations, making them efficient, cost-effective, and safe to the employees, the public, and the environment." Managers, supervisors, and operators should review operating experience information and implement it as the standard suggests. Lessons learned are valuable only if the information they communicate is used.

KEYWORDS: weather, emergency planning, emergency procedures

FUNCTIONAL AREAS: Operating Experience, Lessons Learned, Emergency Planning

2. ELECTRICAL PROCEDURAL VIOLATIONS AT NEVADA TEST SITE

On March 12, 1998, at the Nevada Test Site, a facility manager reported that a union steward discovered a wireman replacing 110-volt breakers inside an energized 480-volt panel without a lockout/tagout or personnel protective equipment. The steward stopped the work and notified the job foreman, who allowed the wireman to complete the breaker replacement using 1,000-volt gloves. Investigators determined that facility procedures for energized work required using insulated gloves and tools and following a "two-man rule." They also determined that site procedures do not permit work on energized systems unless a facility manager or a qualified supervisor approves it. Failure to take adequate precautions when working on or around energized equipment can result in serious injuries or a fatality. (ORPS Report NVOO--LANV-NTS3-1998-0001)

Investigators determined that the wireman believed that the breaker replacement could be performed without using a lockout/tagout device or following procedural precautions for working on energized equipment because the 110-volt breakers were de-energized. They also determined that other equipment in the 480-volt panel was energized. Investigators determined that no one held a pre-job brief before the wireman performed the work. They also determined that the wireman, a new employee who had completed new employee orientation and site training, was inexperienced with the site and facility procedures and misinterpreted the requirements.

The Dynamic Experimentation deputy facility manager and occurrence investigators held a critique of the event. They determined that several procedural violations resulted in the removal of all protective barriers. Following is a summary of the procedural requirements that were violated.

- Supervisors are required to complete detailed pre-job briefings before any work is performed on or near energized electrical equipment.

- Qualified electrical workers are required to directly supervise inexperienced workers.

- Electricians shall only perform work on de-energized electrical equipment that is locked out and tagged out, with the following exceptions: (1) when the work is approved by the facility manager or a qualified supervisor; (2) when removing power could cause an increased or additional hazard, a safety hazard, or a hazardous material release; and (3) when tests or troubleshooting require energized equipment.

- Two qualified electrical workers shall be required when work is performed on or near energized equipment above 240 volts.

- Electricians shall use insulated tools when working on or near energized circuits.

- Electricians shall use eye protection and insulated gloves when working on or near energized equipment.

The deputy facility manager and occurrence investigators continue to review this event and will develop corrective actions when the review is completed.

NFS reviewed the ORPS database for Nevada Test Site electrical-related occurrences to determine what corrective actions were implemented for previous occurrences. Following are some examples.

- On January 12, 1998, a wireman failed to apply a craft lock to a circuit breaker or wear the correct personnel protective equipment when he tightened a loose circuit wire splice, and it arced to ground when his pliers contacted the side of a junction box. Investigators determined that procedures did not require electricians to check for zero voltage on both sides of a splice before performing work. Corrective actions included requiring craft personnel to attend electrical safety refresher training and reminding wiremen to use appropriate lockout/tagout devices. (ORPS Report NVOO--BNLV-NTS-1998-0002)

- On December 20, 1997, two electrical linemen received burns to their hands while performing substation switching operations when an electrical flash-over occurred. Investigators determined that the linemen used the wrong switch stick to perform the operation. They determined that the root cause was insufficient refresher training. Corrective actions included (1) briefing all linemen on the event, (2) requiring linemen to wear leather gloves and full face shields when performing switching operations, (3) installing placards on the switch cabinets, and (4) holding safety meetings to re-emphasize the need to identify potential problems and hazards. (ORPS Report NVOO--BNLV-NTS-1997-0016)

- On July 13, 1991, an electrician received flash burns to his face and hands and a second electrician's hair was burned when they checked a transformer to determine if voltage was present. Investigators determined the work order required the electricians to check the secondary side of the transformer. However, the electricians opened a primary side transformer switch and placed a volt meter on 4,160 volts, which caused the meter to explode and resulted in the electrician receiving flash burns. Corrective actions included posting a danger sign on the transformer. (ORPS Report NVOO--RSNO-JATL-1991-1003)

OEAF engineers reviewed selected electrical occurrences from the ORPS database from October 1, 1990, through March 31, 1997, for reports that resulted in electrical injuries and found 70 reports. Thirty-four of these occurrences were reported as electrical shocks with no other injuries; 15 were reported as burns with no other injuries; 14 were reported as electrical shocks with burns; 6 were reported as shocks with other injuries (usually as a result of falling after a shock); and 1 was reported as a laceration. We compared the rate of injuries (injuries per 200,00 hours worked) for each DOE field office. We determined that the Nevada and Albuquerque field offices have electrical injury rates that are significantly higher than the DOE average and that the Ohio field office did not report any electrical injuries. Figure 2-1 shows the electrical injury rates for each field office.

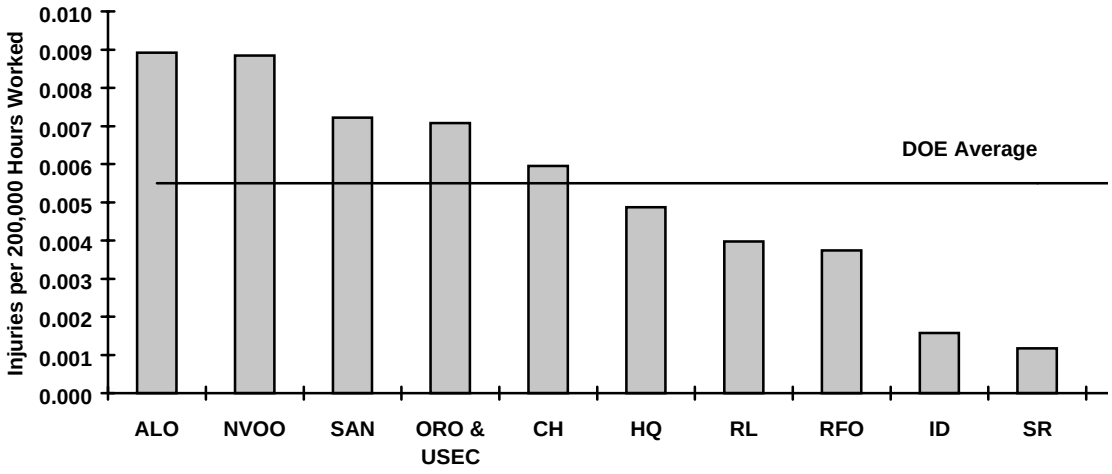

Figure 2-1. Electrical Injury Rates[3]

[3] This data was developed based on 795 occurrences. OEAF engineers reviewed occurrences from October 1, 1990, through March 31, 1998, and found 70 reported injuries. We did not consider electric shocks to be injuries unless they required medical treatment. We also excluded cases where the only medical treatment was an examination with no injury found.

This event illustrates the need for facility managers to ensure that contractors understand and follow work control and configuration management programs. In this event, the wireman believed that neither a lockout/tagout nor personnel protective equipment was required. This is an indication that he either did not understand or did not follow established facility work control programs. It also indicates that facility management failed to adequately communicate the importance of work control programs to him. Facility managers are ultimately responsible for ensuring successful completion of work activities. Routine monitoring of contractor and subcontractor work by facility managers and supervisors will help ensure that electrical maintenance activities are conducted in accordance with facility policy and procedures. DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, states that DOE policy is to operate DOE facilities in a manner to ensure an acceptable level of safety and that procedures are in place to control conduct of operations. DOE/ID-10600, *Electrical Safety Guidelines*, prescribes DOE safety standards for the use of electrical energy at DOE field offices or facilities. Section 2.13.1.3 states that when circuits and equipment are worked on they must be disconnected from all electrical energy sources. These guidelines are intended to protect personnel from electrical shock and potential fatalities.

These events also emphasize the importance of taking timely and effective corrective actions to prevent recurrence. Facility managers should ensure that corrective actions address the root causes identified. They should also review the effectiveness of corrective actions after they have been implemented. DOE contractors who operate nuclear facilities and fail to implement corrective actions for identified deficiencies could be subjected to Price-Anderson civil penalties under the work processes and quality improvement provisions of 10 CFR 830.120, "Quality Assurance Requirements." These actions include Notices of Violation and, where appropriate, non-reimbursable civil penalties. The primary consideration for determining whether DOE takes enforcement action is the actual or potential safety significance of the violation, coupled with how quickly the contractor acts to identify and correct problems. DOE STD-7501-95, *Development of DOE Lessons Learned Programs*, discusses management's responsibility for incorporating appropriate corrective actions in a timely manner.

Many DOE Orders, standards, and guidelines addressing work control programs, training, conduct of operations, correct electrical installations, and management oversight are applicable to this event. Articles 4 also provides information and references on lockout/tagouts and electrical safety issues.

KEYWORDS: lockout and tagout, energized equipment, near miss, lessons learned, Price-Anderson Act

FUNCTIONAL AREAS: Industrial Safety, Management, Licensing/Compliance, Lessons Learned

3. DEFECTIVE WELDS AT Y-12 PLANT

On April 8, 1998, at the Oak Ridge Y-12 Plant, the project engineer for the hydrogen fluoride project notified the Y-12 plant shift superintendent that field welds in a transfer line were defective. A facility representative originally discovered the suspect defective welds during confirmatory visual examinations of field welds on 2-inch and 4-inch Hastelloy® piping. Hastelloy® is a nickel-chromium-molybdenum wrought alloy widely used in chemical process applications and is more difficult to weld than steel alloys. Independent assessors inspected welds based on the facility representative's discovery and determined that seven of nine welds by one welder were rejected

for incomplete weld penetration. Undetected defective welds in the hydrogen fluoride transfer line could result in a spill of hydrogen fluoride, an acid that is highly corrosive to most metals, glass, and concrete. (ORPS Report ORO--LMES-CENTENGY12-1998-0001)

Investigators determined that weaknesses in welder performance, weld inspections, and project management oversight contributed to inadequate welds. They also reviewed the welding inspector's records and determined that 26 out of 150 welds were rejected in-process and repaired. Causes identified for the rejection of welds included incomplete penetration, excessive penetration, lack of purge, and misalignment. Investigators also determined that the operating contractor was required to use American Society of Mechanical Engineers (ASME) codes and standards when fabricating piping systems for the project. Applicable ASME codes require radiographic examination of 20 percent of the field welds. However, project managers substituted "in-process examination" (allowed by code) because he believed that radiography was not permitted because of potential interaction with the criticality alarm system. The project manager began a comprehensive re-inspection (including radiography) of all welds on the transfer line. The facility manager is developing corrective actions to improve programmatic management of welding activities.

NFS has reported on inadequate welds in several Weekly Summaries. Following are some examples, as well as a similar event reported in ORPS.

- Weekly Summary 97-12 reported that a construction welder at the Savannah River Site identified a weld attaching a nozzle to a tank that did not appear to comply with design drawings. The welder was preparing to weld a flange to the nozzle to connect piping to the newly installed tank. Engineers and a welding inspector also inspected the weld and confirmed that it did not appear to be full penetration as required by the design drawings. They filed a nonconformance report to document this condition. Investigators determined that neither the tank manufacturer's quality assurance programs nor the code inspector's review identified the welding deficiency. These deficiencies were not identified upon receipt because weld inspections were not specified for the receipt inspectors. (ORPS Report SR--WSRC-CMD-1997-0004)

- Weekly Summary 92-32 reported that the Nuclear Regulatory Commission issued an information notice on welding defects in the fabrication of uranium hexafluoride cylinders when a licensee discovered attached welds on cylinder valve and plug couplings rather than full-penetration welds as required by the purchase order specification. Ultrasonic testing showed that 11 out of 15 cylinders had coupling welds that lacked full penetration. (NRC Information Notice 92-58, "Uranium Hexafluoride Cylinders - Deviations in Coupling Weld")

- On May 31, 1995, at the Oak Ridge National Laboratory, workers detected a leak in the liquid low-level waste underground transfer pipeline. Investigators determined that the leak was caused by a defective weld in the pipe. The facility manager determined that the root cause of the leak was a lack of a quality assurance program to verify that the construction and installation of the pipeline was appropriate for the waste that was to be transferred through the line. (ORPS Report ORO--MMES-X10WSTEMRA-1995-0001)

These events underscore the importance of good welding management practices including receipt inspection of critical welds on supplied components. Good welding management practices should

include verification of welder qualifications, recordkeeping, inspections, and examinations. The following references should be used by managers responsible for projects involving welding.

- ASME Standard B31.3, *Chemical Plant and Petroleum Refinery Piping Code*, provides the engineering requirements that are necessary and adequate for safe design, construction, examination, inspection, and testing of fluid handling piping systems. This standard, in conjunction with the ASME Boiler and Pressure Vessel Code, also provides requirements for qualifications of welders and inspectors.

- DOE 5700.6C, *Quality Assurance*, includes inspection and acceptance testing criteria. The criteria state that a process should be established and implemented to specify when and what type of inspections are required. Inspections must be conducted using established acceptance and performance criteria, and equipment used for inspections and tests must be calibrated and maintained.

Additional standards for welder qualifications and inspections, as well as information on a wide variety of welding topics, are available from the American Welding Society (AWS). AWS standards have been adopted by ANSI. The Society's URL is http://www.amweld.org/.

KEYWORDS: inspection, certification, welding

FUNCTIONAL AREAS: Construction, Training and Qualifications

4. LOCKOUT/TAGOUT VIOLATIONS

This week, OEAF engineers reviewed two recent lockout/tagout events. On April 14, 1998, at the Los Alamos National Laboratory High Explosives Machining/Pressing Facility, a safety officer and an electrical inspector observed that a journeyman electrician used electrical tape instead of the required standard personal locks to lock out switches on a breaker box. On April 14, 1998, at the Savannah River Site Consolidated Incinerator Facility, maintenance personnel identified an energized circuit while performing a zero-energy check before starting maintenance on locked out equipment. No injuries or damage resulted from these events. However, lockout/tagout inadequacies and violations can result in injuries to employees and loss of equipment configuration control. (ORPS Reports ALO-LA-LANL-HEMACHPRES-1998-0004, SR--WSRC-CIF-1998-0003, SR--WSRC-SLDHZD-1998-0002)

At the Los Alamos National Laboratory, a safety officer and an electrical inspector checking 110/208-volt circuits discovered that someone placed electrical tape across breaker box switches instead of using the required standard personal locks. They immediately stopped work, installed locks on the breaker box, and notified the facility manager. Investigators determined that a subcontractor journeyman electrician applied tape to the switches when he could not find his standard lockout equipment. Investigators also determined that when the general contractor reviewed the hazard analysis with the electrician he said that a standard lockout/tagout on the breaker box would be performed. The facility manager held a critique. Attendees included general contractor personnel and procurement and contract specialists. They believe that this event exemplified how the Laboratory's increased use of small subcontractor organizations has affected work control dissemination and determined that additional contract provisions may be necessary to adequately disseminate work control requirements to subcontractors.

At the Savannah River Site, maintenance workers performed a zero-energy check before replacing a 110-volt air blower temperature switch and discovered that the switch was energized. Investigators determined that the workers checked the switch after facility personnel established a lockout. Investigators also determined that facility personnel performed the lockout based on existing system drawings. The facility manager directed that the investigation continue to determine the reason for the inadequate lockout.

OEAF engineers searched the ORPS database for reports involving lockout/tagout occurrences that led to hazardous electrical conditions and found 142 occurrences DOE-wide. Figure 4-1 shows the distribution of root causes reported by facility managers for these events. Personnel error represented 38 percent of the root causes. Further review of the personnel errors shows that 57 percent were caused by procedure not used or used incorrectly. Management problems represented 38 percent of the root causes. Further review of the management problems show that 35 percent were caused by inadequate dissemination and enforcement of policy and 22 percent were caused by inadequate work planning.

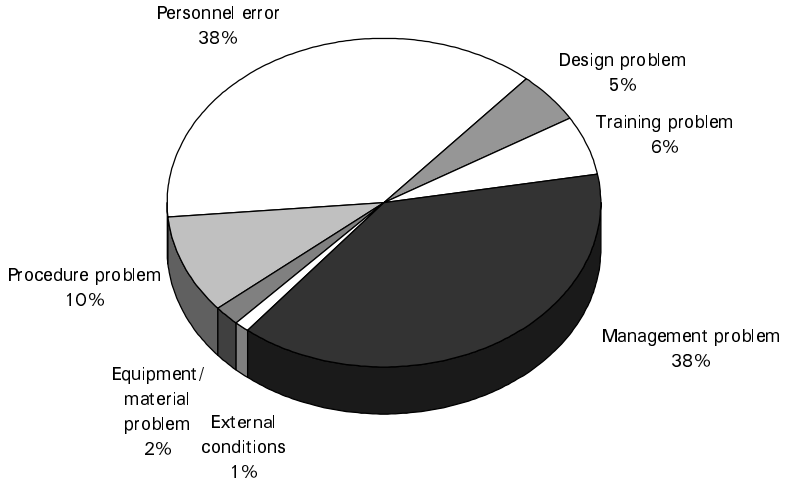

Figure 4-1. Root Causes of Electrical Lockout/Tagout Problems DOE-Wide[4]

These events underscore the importance of using effective work control practices and thorough pre-job planning. In the Los Alamos event, failure to lock out the breaker box using approved methods increased the potential for worker injury. In the Savannah River event, the zero-energy check identified the energized circuit and prevented injuries. However, if this single barrier had failed, injuries, fatalities, or equipment damage could have occurred. Safety and health hazard analysis must be included in the work control process to help prevent worker injury. Pre-job briefings, facility procedures, and training programs should emphasize the dangers associated with electrical activities.

Lockout/tagout programs in DOE serve two functions. The first function, defined in both 29 CFR 1910, *Occupational Safety and Health Standards*, and DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities,* is to protect personnel from injury and protect equipment from damage. The second function is to provide overall control of equipment and system status.

[4] OEAF engineers performed a detailed study of 795 hazardous electrical occurrences that occurred between January 1, 1990, and March 31, 1998. These results are taken from that study.

Lockout/tagouts are typically applied during maintenance activities; however, there are many cases when lockout/tagouts are needed for personnel safety. The standard states that an effective lockout/tagout program requires three elements. These elements are as follows: (1) all affected personnel must understand the program; (2) the program must be applied uniformly in every job; and (3) the program must be respected by every worker and supervisor. A good lockout/tagout program is an important element of an effective conduct of operations program.

DOE facility managers should ensure that personnel understand the basics of work control practices, work planning, and safety and health hazard analysis. Facility managers should review the following references for guidance on lockout/tagout and facility safety programs.

- DOE/EH-0540, Safety Notice No. 96-05, "Lockout/Tagout Programs," summarizes lockout/tagout events at DOE facilities, provides lessons learned and recommended practices, and identifies lockout/tagout program requirements.

- DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, states that DOE policy is to operate DOE facilities in a manner to ensure an acceptable level of safety and that procedures are in place to control conduct of operations. Chapter VIII, "Control of Equipment and System Status," provides an overall perspective on control of equipment and system status. Specific applications of system control are addressed in chapter IX, "Lockout/Tagout," and chapter X, "Independent Verification."

- DOE-STD-1030-96, *Guide to Good Practices for Lockouts and Tagouts*, provides guidance on lockout/tagout program implementation and management at DOE facilities.

- *Construction Safety Reference Guide*, section B.8, discusses requirements for a lockout/tagout program for construction activities. This section of the guide endorses OSHA regulations contained in 29 CFR 1910.147, "The Control of Hazardous Energy (Lockout/Tagout)," and indicates where OSHA training requirements are mandatory.

The *Hazard and Barrier Analysis Guide*, developed by OEAF, includes a hazard-barrier matrix that shows that lockout/tagout is the most effective barrier against injury. When implemented properly, lockout/tagout provides a high probability (greater than 99 percent) of success for risk reduction.

Safety Notice 96-05 can be obtained by contacting the ES&H Information Center, (301) 903-0449, or by writing to ES&H Information Center, U.S. Department of Energy, EH-72/Suite 100, CXXI/3, Germantown, MD 20874. Safety Notices are also available on the OEAF Home Page at URL: http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ons/ons.html. A copy of the Hazard and Barrier Analysis Guide is available at URL: http://tis.eh.doe.gov:80/web/oeaf/tool/hazbar.pdf.

KEYWORDS: electrical, lockout and tagout, independent verification, construction, maintenance

FUNCTIONAL AREAS: Industrial Safety, Hazards Analysis, Lessons Learned, Training and Qualification, Work Planning

5. SECRETARIAL POLICY STATEMENT ENVIRONMENT, SAFETY AND HEALTH

On April 14, 1998, Secretary of Energy Federico Peña announced a new Department of Energy (DOE) safety initiative and said that DOE will adopt a “zero tolerance” policy for serious accidents that result in life-threatening injuries or major environmental contamination. He announced the new initiative at a meeting with Deputy Secretary Elizabeth A. Moler, Under Secretary Ernest Moniz, and senior DOE field officials. The initiative commits the Department to outstanding environment, safety, and health performance. It also endorses continued implementation of integrated safety management—the Department’s response to Defense Nuclear Facilities Safety Board Recommendation 95-2—as the key to improved safety performance. Following is the complete text of the secretarial policy statement announcing the new initiative.

It has been and will remain our policy that the safety of our workers, respect for the environment, and the public health are paramount in all that we do. To meet our strategic goals in national security, energy security, environmental quality, and science leadership, we must integrate safety into our work. That policy has already been incorporated into our Strategic Plan. Now is the time to achieve measurable and sustained results.

Overall Policy. We expect outstanding environment, safety, and health performance as a matter of course in the Department of Energy. At stake are nothing less than the lives and livelihood of our workers and neighbors and a healthy environment to leave to our children. We must expect and demand from ourselves as both federal employees and contractors only the best in terms of environment, safety, and health performance.

It is our firm belief that this will be achieved by implementing the principles of Integrated Safety Management. All managers and workers must accept as their responsibility a concerted and sustained effort to achieve Integrated Safety Management at the Department of Energy.

The fundamental premise of Integrated Safety Management is that all accidents are preventable through close attention to work design and hazard control, and with substantial worker involvement in teams that plan work and select appropriate safety standards. Experience has shown that an investment in prevention brings not only a healthier workplace and a cleaner environment, but notable cost-savings as problems are addressed before they become costly accidents or injuries.

Management must also be committed to a work environment that allows free and open expression of safety concerns, and where workers fear no reprisals or retaliation. Workers are our most important resource for preventing and reporting hazards and potentially unsafe practices.

In addition, we are establishing a goal of 'zero tolerance' for serious accidents that result in life-threatening injuries or major environmental contamination. Should such an event occur, the appropriate Principal Secretarial Officer will meet promptly and personally with us to thoroughly review causes of the event, corrective action plans and the effectiveness of Integrated Safety Management at the site. Appropriate Department of Energy Field and contractor managers will also be asked to attend and participate.

Policy Implementation. This initiative will not end next year or the year after, but will be captured in the way work is done at the Department of Energy. To help assure that the Department continues to move forward to implement integrated safety management, we are taking the following actions:

Safety Management Leadership Forum. We will convene a Safety Management Leadership Forum with senior Department of Energy managers where we will examine and address the major environment, safety and health vulnerabilities at Department sites and discuss the status of Integrated Safety Management implementation. The Forum will be a working meeting and will require active participation from all Field Managers, Principal Secretarial Officers, and appropriate contractor executives.

The emphasis of the Forum will be on safety management within DOE. Issues will include:

- Actions to address major environment, safety and health vulnerabilities identified in previous assessments, including Vulnerability Assessments, Oversight Safety Management Evaluations, and accident investigations;

- Budget allocations and how they are aligned with environment, safety and health concerns;

- What systems are in place to ensure that contractor and subcontractor employees are qualified for the work they perform, have the tools necessary to conduct work safely, and are accountable for environment, safety and health performance; and

- What systems are in place to ensure that employees and managers can without hesitation report and address safety hazards, and that issues are promptly and objectively addressed.

The Forum will be designed to ensure that outcomes are effectively communicated to appropriate levels of each organization. We will also seek the participation of a wide range of safety professionals from both within and outside of the Department. Each day will include a plenary session chaired by the Secretary, the Deputy Secretary, or the Under Secretary. Additional Forums will be scheduled as needed to ensure continued success of Integrated Safety Management across the Department of Energy.

Accountability in Management Contracts. To markedly improve safety at Department of Energy, we need to enhance our contract reform efforts with both for-profit and not-for-profit contractors. Contract reform has already made a difference in terms of enhancing competition and lowering costs. To achieve the same progress in safety, we have asked the Director of the Office of Procurement and the Acting Assistant Secretary for Environment, Safety and Health, in consultation with the appropriate Program Secretarial Officer, to:

- Ensure that our contracts make clear to our contractors that we expect excellent safety performance as a matter of course, both for their employees as well as subcontract employees, consistent with the principles of Integrated Safety Management;

- Require an effective Integrated Safety Management program as a fundamental requirement of contract performance; and

- Ensure that the Department of Energy has the ability to put the contractor's entire performance-based fee at risk where it is warranted by poor safety performance, as defined by specified criteria defined by the Department with the contractor.

We know that you all share this commitment to safety in the Department and look forward to our continued progress.

Federico Peña	Elizabeth A. Moler	Ernest J. Moniz
Secretary	Deputy Secretary	Under Secretary

Text for the new initiative and information about the Department of Energy Integrated Safety Management Program can be found at http://tis-nt.eh.doe.gov/ism.

KEYWORDS: environment, safety and health, policy, integrated safety management

FUNCTIONAL AREAS: Policy/Integrated Safety Management